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FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

Agenda Item . D

Indonesia

INDUSTRIAL DEVELOPMENT OF INDONESIA

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OF INDONESIA

By Ir. ANONDO,
Ministry of Basic Industry and Mining

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INDUSTRIAL DEVELOPMENT OF INDONESIA

by

Ir. Anondo

MINISTRY OF BASIC INDUSTRY AND MINING

CHAPTER I

HISTORICAL REVIEW OF INDUSTRIAL DEVELOPMENT PROGRAMMES

1/. Postwar industrial development programmes contained two main features: First: Programmes such as the Kasime-Plan and Urgency-Programme (1952-55) were considered as stages to reach full industrialization and were based upon conditions of the existing industrial structure which is mainly oriented towards an agricultural base and to the importation of industrial raw materials. Second: The following Plans: the Five Year Plan (1956-60) and the Overall Development Plan (1961-68) are aimed at the idea of opening new lines of productive activities and primarily at the desire of self-support, while in the meantime establishing the foundation for a radical change in the traditional pattern of the economy towards a modern industrialized structure through a programme of industrialization based on the availability of the natural resources of the country.

2/. In developing the existing industrial structure gradually and through stages, the application of science and technology is aimed at improving the methods of production as well as introducing new machineries and equipment, to step up productivity and to increase efficiency. Even if no radical changes were envisaged, the impact upon simple and traditional ways of production was quite substantial and in some cases even disturbing because the new applied technology was unknown before. Technological and research centres are helping new enterprises to meet obstacles facing the industries in their first steps towards full mechanization.

3/. When, however, projects in basic industries have to be planned and executed under the Five Year Plan and the Overall Development Plan, such as oil refineries, fertilizer plants, iron and steel industries, aluminium plants, tin-smelter and nickel refining plants, technological problems arise which the existing technological as well as research centres are unable to cope with, since highly specialized knowledge and well qualified experts are required. The lack of adequate technological and research facilities forced the country to rely heavily on centres abroad in which case communicational problems arose. In this connection the need for continuous exchange of technical know-how, quick exchanges of personnel, samples for laboratory and industrial testing, became apparent. Other difficulties regarding the preparation of drawings, process sheets, lay-outs, determining location and the exact site of the plant, have to be overbridged in which cases usually no comparative materials are available to make up the right judgment and proper evaluation.

4/. The need to combine such experience with the progress of technological know-how is of primary importance for developing nations in undertaking now big projects where advanced technological knowledge and skill are considered most essential. Within this framework of pooling experience and advanced technology, emphasis should be put upon the application of modern science and technology under the prevailing conditions and circumstances where less developed countries have to cope with, among others, the tropical climate, inadequate facilities, the lack of research opportunities and adequate funds as well as expertise personnel.

CHAPTER II

THE TECHNOLOGICAL IMPACT ON SMALL AND MEDIUM SCALE INDUSTRIES

5/. The Loan Mechanization Programme's aim is to mechanize traditional ways of production, which relied heavily upon manual labour and usually were carried out in cottage, home or small-scale industrial enterprises with inadequate tools and limited capital. The introduction of electrical power, modern machineries, up to date equipment, new processes and methods, have stepped up capacity to such a large extent that managerial problems arose as a consequence of this process of mechanization, such as the need for skilled labour and well-trained supervisory personnel, the different requirements for industrial raw materials and spare parts, the urgent need for auxiliary services to help the enterprises when facing mechanical trouble, the radical changes in lay-out, in the methods of processing, the level of production, the changes in the finished products, besides problems of marketing the goods and acquiring the required capital for investment as well as for running the enterprises. Simple technological improvements can give favourable results and small enterprises can more easily face competition even against big firms, since the quality of the products can be better maintained at a lower cost of production.

6/. The Central Production Units (Induks) have been planned to service existing enterprises within a certain locality with the intention of processing available industrial raw materials, which can be done technologically better and at a lower cost, to carry out the finishing stage of production, to disseminate technical know-how which cannot be acquired elsewhere, to train local labour and skilled personnel in various professions and at various levels, to undertake laboratory tests and experiments, and to service equipment and machinery for maintenance and repair. Besides some failures because of the competitive market and locational factors, success has been achieved and the small enterprises have gained the advantage of a regular supply of a good quality of industrial raw materials, a continuous market for its semi-finished products, an improvement of its end-products, a better utilization of its available means of production, which means substantial technological improvement upon its traditional ways of production and operation. Some of these Central Units became model-plants or experimental units to be duplicated by others.

7/. The Research and Training Institutes have basically two objectives : carrying out industrial research, especially applied research, which mainly comes down to experimentations on a laboratory or pilot plant scale; training technical personnel from basic short-term courses to more advanced technical training up to the level of a complete undergraduate college study. Besides these objectives, they disseminate technical information to the public and are testing commercial products to ensure that goods are according to standards and required qualifications for export as well as for domestic consumption. Through a programme of rehabilitation and expansion of these Institutes with the assistance and cooperation of international agencies, they are now covering in their daily task the various fields of industrial activities such as textiles, batik printing, food processing, glass and ceramics, leather works, rubber products, besides other branches in the broad field of chemical and mechanical industries. They are forming the actual link between science and technology on the one hand and the practical needs of the industries on the other hand; they have served the industrial enterprises in improving their technical standards and have contributed to the upgrading and technical training of their personnel in the various levels of their professions.

8/. The State Industrial Bank (Bank Industri Negara) more exactly an "Industrial Finance Corporation", has been the main financial institution to finance development projects under the Urgency Programme and the Five Year Plan,

through the grant of credits with the guarantee of the Government or from its own sources, besides participating through shares in new ventures with private partners. Its activities have not been limited to mere banking and finance; it owns factories, supervises the implementation of industrial projects, promotes the growth of new enterprises, takes over the Board of Management, renders consultant services and advice and in many cases it became the "trouble shooter" to get things done or to get the final decision on an important matter. The manifold functions of the Bank have contributed to the establishment of new lines of production and to the increased capacity of production of various industries. The projects undertaken are of a medium scale where the application of science and modern technology is the most advanced; they are adapted to the prevailing conditions, taking into consideration many existing factors.

9/. The National Planning Bureau drafted the first Five Year Plan which was adopted by Parliament and in its implementation was adjusted yearly to the annual budget of the Government. During the 5 year period, primarily pre-investment activities were carried out, as preliminary and complete surveys, choosing the right technical advisors and consultants, negotiating the supply of raw materials as in the case of natural gas for a fertilizer project, choosing the plant-site, acquiring the land, making up the technical drawings, design and plans, appointing the contractors, studying the availability of raw materials and marketing conditions. Much of the work has to be done with outside assistance and with heavy reliance upon foreign resources. It can be stated fairly that the Five Year Plan covered mainly (1) the pre-investment stage for the implementation of new basic industrial lines to be executed by the following Plan (2) the partial execution of modern medium scale industrial plants (3) the extension of already existing industrial programmes in the field of small industries and (4) the rehabilitation of existing mining activities and exploratory work in mineral resources which again formed the basic preliminary work for the next Plan.

10/. The Overall Development Plan was drafted by the National Planning Council (Depernas) and was adopted by the Provisional People's Congress (MPRS) as the highest political body of the country, to be executed by the present Administration under the President. The main assumption of the Plan was based on the condition that the B-Projects, those earning the necessary foreign exchange, for instance - petroleum, rubber and tin, should finance the A-Projects which are foreign exchange saving, self- as well as non-self liquidating projects, or need foreign exchangefinancing. Despite the lack of detailed programming, a definite set of priorities, coordination and synchronisation in the implementation of the economic over-all Plan has provided for a radical change of the present economic structure towards a full scale industrialization programme on a modern basis by laying the foundations for the basic and heavy industries which rely heavily on the availability of the natural resources of the country, while tackling the consumers' goods industries for the urgent needs of food, clothing and shelter. Furthermore, it should be noted that this Plan has given special attention to the field of research, especially research which is directly connected with the implementation of the industrial and mining projects. It provides the planning of research institutes in the field of chemicals, physics, metallurgy, electronics, geology and mining, aerial survey, telecommunications, etc. The Ministry for National Research has set up Research Councils covering Industry and Technology and this enlarges the previous programmes of Industrial Research and Training Institutes to the broad fields of basic as well as applied research related to the development of the country. The direct impact upon the development projects will be apparent in the applied research carried further to experimentations, product development and pilot projects.

CHAPTER III

THE NATIONALIZED INDUSTRIES

11/. When at the end of 1957 and the beginning of 1958, for political reasons, the Indonesian Government took over approximately 300 Dutch-owned industrial enterprises, it was confronted with numerous managerial problems in the field of production, financing, industrial relations and marketing as well as organisational aspects of management. These problems were partly internal and partly external, varying widely from one enterprise to the other.

(a). Since most of the factories are old, there is usually no overall integration of the plant lay-out. The individual work is done independently without taking much into consideration as to the sequence of operation and the principle of flow, nor is there any consideration of minimum distance. Since every plant has its own characteristic features of lay-out, improvements can only be made on a case by case basis, which is now under way. Operations of material handling are still carried out on a manual basis; they make very intensive use of labour and, therefore, increase operational cost, especially when wages are going up which is now the trend. Because most of the equipment and machineries of the plants are old, extra care has to be given to proper maintenance; a small disturbance somewhere can cause a major disaster. Since getting spare parts is an acute problem, much is required from the technical staff to improvise solutions; some shops are forced to produce equipment themselves, which is very costly and time consuming. Processes and methods of production are in many instances out of date, which causes much waste and inefficiency. Because of the limited facilities of the plants product development and research have not been carried out sufficiently. Due to uncertainties in the supply of imported raw materials, not much production planning and scheduling has been done and if there is some scheduling, the work usually lags far behind the projected schedules. Because most of the raw materials and spare parts have to be imported, which depends upon the availability of foreign exchange and import licenses, no adequate stock can be maintained. Only in bigger plants producing standardized articles inspection and quality control have been introduced. Despite above obstacles and deficiencies, much can still be done to improve the methods of production in the nationalized industries and even if radical changes are sometimes opposed by conservative elements, the process of under-taking modern production management has been accelerated by the introduction of training courses on the job and other management courses.

(b). Problems concerning financial management are also numerous and can only be solved slowly. The centralized financial administration has to be changed and much work has to be done to reform, adjust and decentralize the financial administrative procedure. Most of the enterprises have to set up their own finance department, secure their own operating capital and watch their liquidity position. They have to introduce modern cost-accounting, which has never been used before, and to pay special attention to increased expenses on social securities and rising prices of raw materials.

(c). Syndicalist movements in the beginning of nationalization were prevented by armed intervention. Management-labour relations under-went drastic change and sharp conflicts previously encountered between management and trade-unions have gradually been transformed into peaceful settlements between the two parties. Special attention has been given to social security, wage incentives, and a better appreciation of the worker's contribution towards production. Industrial relations have been improved and old-fashioned views of control towards the working forces have been replaced by modern tools of personnel management.

(d). No real marketing problems have been encountered, because of the seller's market position for most of the enterprises. In this connection there were still many problems to be solved on transportation and storage difficulties, price controls, rigid administrative controls on channeling the distribution, changes of marketing institutions, shortages of packing material etc.

(e) The exodus of Dutch managerial personnel created an acute shortage of competent managerial personnel and only after careful staffing and by replacing them by well qualified and trained personnel, which took two to three years, has the problem been solved.

12/. After three years of experience in dealing with nationalized enterprises, it was considered necessary to amalgamate the various forms of State enterprise into one form of State Enterprise incorporated by law under the basic "Law on State Enterprises". The emergence of this new form of state enterprise under this law has integrated the independent units into one large operation, strengthening their monopoly position and scrutinizing inefficient operation. It has improved specialization, consolidated the various activities and pooled its technical know-how and financial resources.

CHAPTER IV

RECENT EXPERIENCES ON THE PRE-INVESTMENT STAGE

13/. The Overall Development Plan has provided for an overall plan covering 335 projects spread over a wide field of activities.It does not, however, provide for programmes based on definite conditions or assumptions, nor does it determine strict priorities on which detailed programming could be based and on the whole remains rather vague in the way of how to implement the Plan. This leaves much room for the executive agencies to make up their own programming. The selection of projects to be implemented has been based upon the availability of sources of financing, especially that of foreign exchange. The availability of credits granted by many countries has become the basis to select the projects. Suppliers' credits usually limit the purchases of the type of equipment, machineries and services involved; this limitation exists in the number of suppliers, the application of technology, the availability and quality of expert knowledge, training facilities, in the prices of the equipment and services, in the selection of the machineries in determining the kind of processes, designs and drawings and in the way of implementing the projects. This way of programming guarantees the source of foreign exchange, but is in many respects unsatisfactory, considered from a technological and economical point of view.

14/. When the supply of foreign exchange became scarce owing to the rather heavy terms for the repayment of the loans such as a long grace period, due to balance of payments difficulties, the basis of priority was shifted to the availability of the local currency funds which according to existing procedures, had to be supplied through the regular Annual Budget. As far as possible the projects submitted for approval should be based on priorities outlined by the Central Government.

15/. Since experience has shown that the lack of proper programming have forced the executing agencies to be opportunistic in obtaining the necessary funds, an urgent need is felt for better programming, taking into consideration the various determining factors and conditions that will guarantee the success of the Plan. The important aggregates as saving and investment, exports and imports, Government expenditures, the general level of prices and other aggregates that determine national income should be considered in relation to the

various programmes in every sector. If aggregate planning is not related to sectorial planning nor to the programming of the individual projects, the one may offset the other and the end result may be disappointing.

16/. In framing the Overall Development Plan the interest of the regions has been considered seriously and the geographical distribution of the projects is mainly based on political justification. With this in mind the location of the projects has been more or less pre-determined without adequate surveys or preliminary investigations or whether a certain location is technically feasible and economically justified. This creates special problems for market-oriented as well as resource-oriented industries.

17/. Very important in projecting projects of the nature of resource-oriented industries are the available natural resources, proven reserves and mining quantities which qualitatively have to meet the requirements for processing or manufacturing. The pre-investment work which consists mostly of surveys represents the most important stage since it all depends upon the acquired data whether the project should be set up or is technically not feasible. Sufficient geological surveys should be undertaken before a resource-oriented project can be decided upon and the location and site can be chosen.

18/. The collection of engineering data is also of primary importance to decide on the implementation of the project. In the pre-investment stage, all engineering data should already be collected, shifted, systematically arranged and properly evaluated and whenever necessary, laboratory tests should be undertaken. The gathering of engineering data can be done simultaneously with the undertaking of surveys and only if all technical data are collected, the technical feasibility of the project can be decided.

19/. The scale of production can be determined according to the availability of the raw materials or according to the market conditions. Both considerations should be calculated to determine the total investment and to know the unit cost of the plant in order to determine further whether the project is sound, profitable or not, quick yielding or self-liquidating. It should make use of economies of scale in the choice of equipmentand machinery, in the choice of processes, in the determination of lay-out, in the efficient use of the factors of production, the advantages of the latest technology, and other economies avoiding diseconomies of scale.

20/. The cost of the plant only might be small; the cost of the total overheads may exceed the cost of the plant and the whole investment might be very high. The importance of economic and social overheads should not be overlooked, especially if a plant has to be set up in underdeveloped regions which have nothing to offer in terms of facilities such as electrical power, watersupply, roads, bridges, harbour facilities, storages, construction services, besides other social overheads such as the availability of labour forces, schools, hospitals, training and recreational facilities, etc.

21/. The additional cost of investment for building the infrastructure should ultimately be calculated in the total cost of investment and the indirect benefits by creating other economic activities in relation to the direct benefit of the plant. The cost-benefit ratio is then very difficult to determine since no one knows whether the indirect effects are forthcoming. It is still a political price that should be paid in determining a major project. It is against above background that the economic and social overheads should be judged. For new developing nations it is not purely economic considerations that will determine big or medium scale industrial projects; there are too many other considerations that should be reckoned with in order to be able to interpret the aspirations of the planners and the desire of a nation. Projects that are economically justified, with their risk reduced to a

minimum, can only be undertaken in well-developed regions of the country, usually according to traditional lines, and where technology is well-known and the market is secured. No ventures will be undertaken, no new opening of underdeveloped regions entered upon, no new technologically advanced plants will be built, if economic justificationc is the only consideration. The economic justification of a project should be based on what price the nation what price the nation is willing to pay when it undertakes a venture, the risk being involved with due regard to the political justification. This broadens the narrow concept of pure economical justification when undertaking an investment for developing nations.

22/. In the scope of implementing developmental projects a very important factor is the way of cooperation between the nations involved in the projects. The experience with Socialist countries has taught that they are not willing to undertake turnkey-projects, leaving all responsibility to the receiving country; some countries are merely interested in selling the equipment and machineries; economic and overheads are not their concern. Only with the United States, Turnkey projects can be undertaken. This certainly has its advantages as well as its disadvantages. For totally new ventures turnkey-projects are preferable; for already known technology a turnkey-project might be too expensive. Once a new technology has been applied and introduced through a turnkey-project, it is advisable for a nation to learn as much as possible from the turnkey-project regarding the application of technology in order to tackle the problem itself for the next similar project. A turnkey-project should only be done once and should not be repeated because it is costly and educational-wise unsound.

23/. During the implementation of so many Development Plans, Indonesia has learned the hard course of industrial development; it cannot do the job without outside cooperation or assistance. This technical cooperation or assistance might be received in many forms; in whatever form, it is a prerequisite to speed up development. The way of international cooperation can overbridge the technological gap that exists between advanced and less developed countries which can save unneccessary large funds for their own research and development projects and most importantly can accelerate the pace of economic development in order to close the difference in the standards of living between advanced and less developed.

CHAPTER V

CONCLUDING REMARKS

24/. One may conclude after stocktaking of progress and assessment of experiences in industrial development programmes undertaken in Indonesia, that the application of science and technology might continuously be changed according to the direct and immediate needs under the prevailing conditions of the country. The scientific and technological development should constantly be promoted and stimulated; the application of advances in science and technology should be incorporated directly to the practical problems in the implementation of industrial projects and should be adjusted accordingly, cresting thereby the stimulus to develop themselves to further progress of science and technology which can best serve the urgent needs of less developed countries.

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INDUSTRIAL DEVELOPMENT OF INDONESIA

by

Ir. Anondo

Ministry of Basic Industry and Mining

1/. Whereas at the beginning of the industrial development programme the emphasis was on small industry using agricultural raw materials and gradually stepping up to full industrialization through revolutionary stages leaving the growth of the economy to the spontaneous forces of free enterprise, the latest Plan departed from this early concept and demanded a radical change of the traditional pattern of the economy through a programme of modern industrialization based on the availability of the natural resources and to be undertaken especially by the public sector.

2/. The application of science and technology aimed at improving the methods of production as well as introducing new techniques and up-to-date machinery and equipment, and this impact upon simple and traditional ways of production is quite substantial. When bigger projects in basic industries are to be planned and implemented, highly specialized knowledge and experts are required and the lack of adequate technological and research facilities forced the country to rely heavily on centres abroad in which case communicational problems arise. The need to combine experiences with the progress of technical know-how is of primary importance for developing nations in undertaking new and big projects and emphasis should be put upon the application of modern science and technology under the prevailing conditions and circumstances which less develcped countries usually have to cope with.

3/. Development institutions are very important in the execution of programmes and industrial projects. Their functions vary widely from one another, also the kind of equipment and necessary experts. There should be a close contact between the planning institutions and the executing agencies; their ideas and experiences should be exchanged mutually, the performances evaluated properly and the programmes should be adjusted constantly to changing conditions. The ideas of plans and programming once materialized in the physical execution of projects, should conform with the actual facts and realities and when necessary be altered, changed or adjusted to make the implementation possible.

4/ Experience in handling nationalized industrial enterprises from the point of view of the various aspects of management production, financing, industrial relations, marketing and organization, have taught us how important it is to plan carefully and set up plants and factories, especially in connection with the various aspects of production management such as lay-out, kind of processes, type of equipment and machinery, inspection and quality control, research and product development, production planning and control, etc. Once the plant is in operation, inefficiency and low productivity may be avoided if the various managerial aspects of running the enterprise have been carefully thought out and properly planned in advance. The existing industries play a significant role and can be used as an important tool in carrying out new development projects, but they should be consolidated, modernized, expanded and equipped with the necessary physical facilities as well as human skills to carry out their new functions properly.

5/ The pre-investment stage in the execution of development programmes is a prerequisite for success. Without sufficient work and study on the pre-investment stage, the implementation of projects might encounter obstacles that might not be overcome or only at such a high price that it would defeat its purpose. Especially if a project is a resource-oriented industry, the results of geological surveys and engineering studies must be the decisive factor for determining the technical feasibility, the location and the site of the plant. Economic overheads should not be overlooked and coordination among the various executing agencies should be properly maintained. To justify economically a project, other non-economic factors should also be considered although the emphasis on pure economic justification and technical feasibility must prevail.

6/. The application of modern science and technology in less developed countries should stimulate the existing forces to carry the impact even further and develop its own techniques and advance its own progress according to prevailing conditions and circumstances.

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Agenda Item: D

Czechoslovakia

SOME PROBLEMS OF EFFECTIVENESS OF INVESTMENTS IN INDUSTRY

By Ing. Paikert ZDENĚK,
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No. 1201 Some Problems of Effectiveness Investments in Industry
D.

By

Ing. P a i k e r t Zdeněk, Head of Department, Research Institute of Economic Planning, State Planning Commission of the Czechoslovak Socialist Republic

1. Industrialisation as a necessary condition for the speedy development of productive forces in economically underdeveloped countries

(1) Industrialisation may be characterised as the process in the development of productive forces of a country during which, because of the increase in the production of the means of production a speedy extension of the material and technical base of all other branches of national economy takes place.

(2) As industrialisation is expressed foremost in the intensive construction of industrial plants where part of social labour is turned into industrially productive plants and equipment / = fixed capital /, society is not indifferent as to how much social labour it expends on these productive investments, for the results of the realisation of this labour is not directly the production of use values serving the satisfaction of the needs of the population / which is the lasting aim of social effort for instance in socialist countries and in economically underdeveloped countries this is an urgent contemporary task; / investments in production are, however, a necessary condition to attain this aim.

(3) The speed of industrialisation measured by the absolute increase in the physical volume of industrially productive plants per unit of time is limited by the maximum amount of means society is capable of expending on these purposes during this time unit. Determining the extent of these means is one part of the problem concerning investment construction, especially in the period of industrialisation.

(4) During industrialisation considerable changes take place at the same time in the development of the structure of the economy of the country, especially changes in the structure of sectors in the sphere of production. The development of the structure of sectors in the sphere of production of economy and thus also the development of the structure of sectors in the industrial production of the country depends on the one hand on the

development of social needs, and on the other hand on the developmer of objective conditions under which production takes place, mainly on the development of natural conditions which considerably influence the territorial division of labour within a country and among countries and are one of the main causes for the difference in the structure of production and the structure of the needs of society. The structure of sectors greatly influences the economic aspects of construction.

(5) It is for instance well known that the construction of heavy industry / e.g. metallurgy, heavy engineering, chemistry of coke, petro-chemistry, etc./ on the one hand makes great demands on investments; that the period of construction is considerable; that these sectors need a large power supply so that it is necessary during their construction to expend a considerable volume of investments on coal mining and the production of oil, the building of power stations, etc. On the other hand, however, where costs for the utilisation of the raw material and power resources for these branches are rather low due to favourable natural conditions, the construction of these sectors guarantees the speedy development of the productive forces and an increase in the standard of living of the population in the respective country in the future.

(6) The construction of light, mainly processing industry / e.g. food, textile, clothing, leather, ceramics, wood-working industry, etc./ demands less investments, the period of construction is comparatively short, far less power is needed and the industries in question produce products directly for the satisfaction of the needs of the population. It is usually not too difficult to obtain raw materials for these kinds of products. These branches are mainly based on agricultural and lumber production. The turnover of capital invested into these branches is quicker. On the other hand it is equally well known that both construction itself as well as the further development of the material and technical base of these and other branches depend on the existence of heavy industry, especially heavy engineering, the chemical industry, the industrial production of building materials, etc.

(7) The determination of the optimum structure of sectors for investments especially during the period of industrialisation is the other part of the problem of investment construction under discussion here.

(8) Even though the correct solution of the problem of industrialisation in countries that are at the present time considered as economically underdeveloped is not simple, there is no doubt that industrialisation is an objectively necessary process in the development of the economy of areas and countries having natural resources and man power, which may be attained purposefully and speeded up on the basis of a knowledge of the structure of the social needs, the objective conditions and concrete possibilities while at the same time eliminating obstacles arising out of the character of productive

relations.

(9) An important part is plaid throughout by the economic effectivity of investments.

2. Some problems of effectivity of investments in the period of industrialisation.

(10) Opinions for the ascertaining and measuring of economic effectivity vary. Very often means for investments are expressed as a ratio of the increase of the national income, at other times as that of the increase in production, or the influence of investments on the increase in the productivity of social labour is calculated, etc. Every one of these methods of measuring the effectivity of investments has its justification and both the advantages as well as the disadvantages are not entirely unknown. One of the problems of effectivity of investments as indicated above is the determination of the volume of investment in the course of a certain / e.g. unit / period. In attempting a general formulation of the problem the following basic considerations may be used as a starting point.

(11) If the lasting aim of society is to achieve a continuous increase in the standard of living of the population, this aim can only be attained on the basis of the continuous increase of that part of the national income allocated for consumption.

(12) Between the amount allocated for a consumption and the increase in investments over a certain period there exists a certain quantitative relationship. The increase in the amount allocated for consumption over a certain period equals the increase in the gross national income minus the increase in investments:

$$S = N_d + A_m - I, \qquad /1/$$

where S = the amount allocated for consumption per unit of time,

N_d = the net national income per unit of time / together with A_m it forms the so-called gross national income / ,

A_m = depreciation per unit of time,

I = investments per unit of time.

(13) In any period of time the increase in the amount alloted for consumption must be greater than zero. That means that during any period of time the volume of investments must be smaller than the gross national income:

$$I < N_d + A_m \qquad /2/$$

This inequality is identical with the following inequality:

$$I < P - M \qquad /3/$$

where P = the value of the social product created during the period,

M = value of the materials and raw materials used.

The proportions between I, P and M are illustrated in the following table:

Table 1

Indicator	NN	Symbol	Period 1 e.g.1955	Period 2 e.g.1957	Increase	Index
	0	1	2	3	4	5
value of social product	1=2+3+4+5	P	50	60	+ 10	120
value of materials and raw materials used	2	M	20	25	+ 5	125
depreciation	3	A_m	5	6	+ 1	120
wages	4	Z	15	16	+ 1	107
value of product for society	5	N	10	13	+ 3	130
national income	6=7+9(=1-2-3)	N_d	25	29	+ 4	116
accumulation	7	A_k	5	7	+ 2	140
investments	8=6+3-9	I	10	13	+ 3	130
consumption	9	S	20	22	+ 2	110
number of population in %	10	L	100	103	-	-
index of amount of consumption per head of population	11		-	106,7	-	-

(14) It will be seen from this table that both in the separate years / 1955, 1957 / as in the increases for the two-year period relationship /3/ is fulfilled:

Year 1955: 10 50 - 20

Year 1957: 13 60 - 25

Increase: 3 60 - 50 - (25 - 20)

(15) It is necessary but insufficient condition for the correct application of investment policy to keep the last of the above-mentioned quantitative relationships. The other and decisive condition is the necessity of the increase in the amount allotted for consumption per head of population so that the increase in this amount must be greater than the speed of increase in the number of population as expressed by the following inequality:

$$\frac{dS}{S \cdot dt} \qquad \frac{dL}{L \cdot dt} \qquad /4/$$

where $\frac{dS}{S \cdot dt}$ = the infinitisimal expression of the relative increase in the amount allocated for consumption per unit of time / $S = f_1(t)$;

$\frac{dL}{L \cdot dt}$ = dtto number of population / $L = f_2(t)$; L = number of population in time t

(16) If the average consumption per unit of time and head of population at a certain moment is given as $\underline{s}$ then it is valid that:

$$s = \frac{S}{L} \; ; \; / s = f_3 (t) / \qquad / 5 /$$

then the highest economic effectivity of investments at any moment in the development of the national economy is achieved when the following relationship is continuously fulfilled:

$$\frac{ds}{dt} = \max! \qquad / 6 /$$

which lays down the condition that the average consumption per head of population and unit of time should continuously increase as much as possible.

(17) The demand can be fulfilled under condition that the amount allocated for consumption per unit of time / S / is at its maximum. As the amount allocated for consumption is the function of the volume of investments / $S = A_m + N_d - I$ /,

$$E = \frac{S}{I} = \frac{A_m + N_d}{I} = 1 = \max! \qquad / 7 /$$

where E = the index of effectivity of investments.

Thus: $$\frac{P - M}{I} = \max! \qquad / 8 /$$

(18) The total volume of means expended in the course of a certain period on productive investments has from the point of view of reproduction itself of basic productive plants and equipment / or fixed capital / its own structure and is divided into four parts / A, B, C, D /.

(19) The first part / A / are means expended on general repairs of those productive plants which are running in the given period of time. These means are a "necessary evil" for they do not cause any considerable change in the form of the repaired plants but only eliminate the results of their physical wear. The volume of these means depends on the physical volume of the productive plants, their age and the intensity of physical wear.

(20) The second / B / are means expended on the renewal of plants scrapped during this period. The volume of these means depends on the physical volume of plants in existance and their average service life.

(21) The third part / C / includes means spent on the establishments of plants by which the whole group of production plants during the given time is increased. This volume of means is the characteristic for the rate of growth of reproduction and one of the basic presuppositions for the increase of the total production during the given period.

(22) The fourts part / D / represents means spent on the construction of plants which during the given period are not yet put into production. These means are the presupposi-

tion for the further increase in production in the future. Their volume depends on the average time of construction and how the volume of production is planned for the next period.

(23) From the point of view of increase in production caused by investments the above-mentioned volumes of means may be classified as follows:

(a) volume of means / C / leads to the greatest increase in production

(b) volume / B /, / renewal / causes increase in production only as a result of technical progress

(c) volume / A /, / general repairs / causes either a very slight or no increase in production

(d) volume / D / under no account leads to any increase in production during the given period of time

(24) The period after the beginning of the speedy construction of industrial plants with a high speed of industrialisation may be divided into three stages:

(i) in the first stage the greatest share of the total volume of investments is represented by unfinished investments / D / that have no effect on production at all. This stage is the most difficult from the point of view of fulfilling the demand of the maximum increase in the amount allocated for consumption per head of population where exclusively the country's own resources are used to make these investments. The length of this stage equals the length of construction of industrial plants which depends on the branch structure of investments

(ii) The second stage is characterised by the greatest speed in the increase in production as quite new plants are put into production that do not need any considerable repairs. Thus effectivity of investments begins to show in its full extent as part / C / increases relatively most quickly

(iii) In the course of the third stage the part of means expended on general repairs starts increasing, which relatively decreases the effectivity of the total investments.

(25) Towards the end of the third stage part / B / begins to increase / renewal / thus relatively increasing the effectivity of investments / as a result of technical progress / and then during further extension of the physical volume of plants the structure from the point of view of the relative ratio of parts A : B : C : D changes relatively little and becomes almost stabilised. The total length of these three stages depends on the time of turnover of fixed capital increased by the time of construction.

(26) The effectivity of investments may therefore be symbolically expressed by the following relationship:

$$E = \frac{P - M}{A + B + C + D} \qquad /9/$$

(27) The volume of production / P / depends on the total physical volume of fixed capital / F / on its effectivity / U / and the coefficient of the duration of its use / k_t / :

$$P = F \cdot U \cdot k_t \qquad / 10 /$$

(28) The value of raw materials and materials used depends on the volume of production / P / and the coefficient of requirements of material / k_M / so that the effectivity of investments may be expressed as folows:

$$E = \frac{F \cdot U \cdot k_t \ (1 - k_M)}{A + B + C + D} \qquad / 11 /$$

(29) At the beginning of industrialisation / during the three stages / the volume of means / B / is small and the volume of means / A / - respectively the sum of A + B is determined more or less objectively / and can be minimised on the basis of determining the optimum average service life /. The effectivity of the physical volume of fixed capital / U / and the coefficient of requirements of materials / k_M / depend on the structure of sectors of fixed capital / F / which is the result of construction in the past. This is why the determination of total volumes / C / and / D / is decisive during every stage and the arrangement of the structure of its sectors in such a way that both during the given stage as well as in the future the demand expressed by relationship no. 6 should be fulfilled:

$$\frac{ds}{dt} = \max!$$

(30) This can be achieved over a long period of development only by a suitable combination of the construction of industries producing both consumer goods as well as means of production.

3. Some experiences in industrialisation from Czechoslovakia.

(31) In the Czechoslovak Socialist Republic, which set out on the road of socialist construction after the Second World War, the intensive industrialisation of economy is one of the most typical features. At the beginning of socialist construction Czechoslovakia was a country with a relatively highly developed industry. The share of industry in the creation of the national income in 1948 amounted to 67 % . The greatest share in the total volume of industrial production was taken up by the food industry which was mainly based on the home agricultural production. At the same time a very large part was played in the total industrial production by the engineering and metal industry.

(32) One of the basic tasks of socialist construction in Czechoslovakia was to raise the standard of living of the population of Slovakia to that of the population of the

Czech lands, as Slovakia as a result of previous development was a backward agricultural region. The fulfilling of the program of the speedy industrialisation of Slovakia was based on the further development foremost of heavy industry in the Czech lands, mainly engineering industry, metallurgy, mining, chemistry and power production.

(33) One of the most important tasks was the equipment of agriculture in Czechoslovakia with modern machines during its socialisation which means a change-over from small-scale production to socialist large-scale production with a simultaneous absolute decrease of man power in agriculture and their switch-over to industry.

(34) Similarly it was necessary in the food and consumer goods industry to change over from small-scale production by craftsmen to industrial large-scale production, ensuring a considerable increase in the productivity of labour.

(35) This speedy construction and reconstruction of the economic structure of Czechoslovakia was conditioned by intensive investments, mainly in industry. From total investments made during the period 1951 - 1960 in national economy which amounted to 270 milliard Kčs 109 milliard Kčs was put into industry, i.e. 40%. The value of basic funds put into production in the state industrial enterprises during this period amounted to 98 milliard Kčs, the overwhelming part of these means being increases in production capacity. At the present time the share of investments for renewals in the total share of investments is beginning to increase.

(36) As a result of industrialisation total industrial production in Czechoslovakia in the period from 1948 to 1960 increased 3,72 times, in Slovakia 5,23 times; production of power increased 3,6 times, in Slovakia 6,6 times; metallurgy 3,75 times, in Slovakia 4,13 times; engineering 6,63 times, in Slovakia 10,11 times; chemical industry 6,04 times, in Slovakia 8,34 times; food industry 2,64 times, in Slovakia 3,87 times.

(37) The share of industry in the total creation of national income increased from 67% to 70%.

(38) The national income of the Czechoslovak Socialist Republic increased 2,51 times and the personal consumption 2,01 times.

(39) From the point of view of production and consumption of the most important products Czechoslovakia takes its place among the most developed countries in the world.

(40) By developing industrial production and productive forces in Czechoslovakia during the above mentioned period the mobilisation of the internal resources of the country was achieved as well as of the intensive creative activity of the working people. At the same time cooperation with the countries of the world socialist camp was increased and intensified.

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FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D

Czechoslovakia

SOME PROBLEMS OF EFFECTIVENESS OF INVESTMENTS IN INDUSTRY

By Ing. Paikert ZDENĚK,
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Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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Some Problems of Effectivity of Investments in Industry

by

Ing. P a l k e r t Zdeněk, Head of Department, Research Institute of Economic Planning, State Planning Commission of the Czechoslovak Socialist Republic

(1) A speedy increase in the standard of living of the population of economically underdeveloped countries may be achieved through industrialisation which ensures the increase of employment as well as putting more means of production at the disposal of the workers thus making possible a more intensive use of the natural resources and power supply, which is a necessary condition for the increase in the production of material goods necessary for satisfying the needs of every member of society.

(2) Industrialisation of economically underdeveloped countries is a historically necessary process which may be purposefully brought about by a suitably chosen intensity and structure of investment construction.

(3) Effectivity of investments may be judged from various view points. Important for judging effectivity of investments is the demand of an increase in the allocations made to personal and social consumption per head of population. A maximum increase in the allocation for consumption per head of population per unit of time, while this increase remains continuous in this case means the maximum effectivity of investments.

(4) Effectivity of investments in the period of industrialisation which is accompanied by a quick increase in the physical volume of erected plants has its lawful stages. The length of these stages in which changes in effectivity of investments during industrialisation occur depends on the structure of sectors of investments. The structure of sectors of investments depends on social needs, natural conditions and also on the amount of means a certain country has at its disposal. The construction of light engineering is accompanied by a relatively higher effectivity of investments, i.e. a speedier and earlier increase in the standard of living of the population. The construction of heavy industry is "more difficult", as effectivity of investments measured by the increase in the standard of living of the population becomes noticeable after a longer period of time, but its need is clearly expressed after a certain time.

(5) This is why from the point of view of ensuring a continuous increase in the standard of living of society during industrialisation also over a long period of time it is necessary to choose a suitable combination of the branches producing consumer goods on the one hand as well as means of production on the other.

(6) Using the example of industrialisation in the Czechoslovak Socialist Republic in the years 1948 to 1960, a country which set out on the road to socialist construction with an already considerably developed industry we give an illustration of the considerable influence of industrialisation on the structure of national economy and the increase in the standard of living of the population mainly in those areas that are economically less developed.

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Agenda Item: D.13

United Kingdom

THE PRODUCTION OF GLASS : POSSIBILITY OF SMALL SCALE PRODUCTION

By L. H. A. PILKINGTON,
J. P., LL. D., M. A.

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THE PRODUCTION OF GLASS - POSSIBILITY OF SMALL SCALE PRODUCTION

by

L.H.A. PILKINGTON, J.P., LL.D., M.A.

1. There are six main types of glass used in building:-

(a) Sheet or window glass
(b) Plate glass
(c) Float glass
(d) Patterned glasses - including cathedral and rolled and wired glass
(e) Hollow glass blocks
(f) Opaque cladding glasses for cladding the outside of buildings

2. The basic glass for all these forms is the same although there may be minor modifications to the chemical composition to produce coloured or opaque glasses. Figure (I) shows in schematic form the process of manufacture starting from the common tank furnace.

3. Although the tank furnace is of similar appearance for all the products, in fact it may be quite different in design and in operation when used for the different products because of the quality or load requirements of the particular glass.

4. For instance, in the manufacture of Plate or Float glass a very high standard both for planimetry and absence of faults within the glass, such as bubble, is required. In Rolled Plate and other obscured glasses the quality requirements are much lower and the furnace is run in quite a different way.

5. However, for descriptive purposes we can assume that all the products are produced from the same furnace.

6. The Figure shows the flow of raw materials to the factory. These materials are stored in silos in quantities large enough to ensure adequate supplies to cover any delays in delivery due to transport difficulties, seasonal working in the raw materials quarries or any other reason.

7. From the silos the materials are weighed and fed to a mixer (B) and after thorough mixing transported and fed into the filling end of the tank furnace (C) where they are melted and fined and cooled to the right temperature for rolling, drawing and pressing, as the case may be.

8. COMPOSITION:

The typical chemical compositions for the glasses are as follows:-

	SHEET	PLATE	ROLLED	PRESSED
SiO_2	72.0 - 73.0%	70.0 - 72.6%	71.5 - 72.7%	72.4%
CaO	7.0 - 8.4%	9.6 - 12.1%	8.8 - 10.1%	7.4%
MgO	3.7 - 4.6%	2.0 - 3.2%	2.4 - 3.9%	2.9%
Al_2O_3	0.7 - 1.5%	0.1 - 1.1%	1.1 - 1.3%	1.9%
Na_2O } K_2O }	13.0 - 14.5%	13.4 - 13.8%	13.5 - 13.8%	14.8%
Fe_2O_3	0.08 - 0.16%	0.05 - 0.13%	0.13 - 0.16%	0.065%

9. RAW MATERIALS:

Careful chemical and physical control of the raw materials to specification is very important and a careful watch must be kept for contamination by such materials as chromium and iron, and the moisture content of the materials should also be held at a low and consistent figure - a figure of 4% in the mixed batch is quite commonly used.

10. WEIGHING & MIXING:

It is, of course, important to have a good accurate weighing machine which is regularly checked, and a really good mixer. Various types of mixers are available but those mainly used have been designed originally for mixing concrete or mortar.

11. TRANSPORT OF MIXED BATCH:

The thoroughly mixed raw materials, known as batch, are transferred to the furnace by some means which will not shake them in such a way as to cause segregation. Skip transport is probably most common and the skip will take the whole of the contents of the mixer.

12. The mixed batch is fed together with broken glass or "cullet" into the furnace in a variety of ways. There are proprietary makes of mechanical feeder or the batch may be emptied direct from the skip onto the filling pocket of the furnace.

13. FUELS FOR HEATING THE FURNACES:

Three systems of heating glass furnaces are now common - producer gas made within the factory from coal; heavy oil; natural gas. Electrical is also sometimes used.

14. Because about half a ton of coal or its equivalent is used for every ton of glass melted, the most important factor in deciding which fuel to use is the cost. This should be calculated in terms of the cost per therm at the furnace valve or port. Once this has been calculated the choice is almost made but oil or natural gas have some inherent advantages due to

the consistency of their composition and their ease of handling. Price being equal there is little doubt that the vast majority of glass manufacturers would choose either natural gas or oil rather than coal.

15. THE FURNACE:

The Figure shows a typical glass melting furnace.

16. The batch is fed in at E, passes out into the melting end of the furnace F where it is heated by flames from the port I and then gradually flows down the furnace to the "working end" G and is cooled down to the appropriate temperature for drawing, rolling or pressing at H.

17. The construction of the furnace will consist of a bath to contain the molten glass, side walls and roof above the glass and combustion space, the firing ports, regenerators and associated flues. These various ports are built of different types of refractory material. The sides of the bath at the melt end will be built, almost always, from blocks of electrocast refractory material of the best grade. Further down in the cooler parts of the bath and on the bottom of the bath a less refractory material can be used, either a lower quality and cheaper electrocast refractory or a burned clay block. These parts of the furnace wear much less rapidly, mainly due to the lower temperature of the glass, but also due to the fact that the blocks at the melting end are in contact with the melting batch which is very corrosive.

18. The roof of the furnace and the side walls above the glass level are built from very high quality silica bricks. Not only is chemical composition important but also dimensional accuracy.

19. SHEET OR WINDOW GLASS:

Glass made by this process is used in very large quantities in most countries of the world, and though there is at the moment probably more capacity than is necessary in the world, with the increase in building, which is going on everywhere with more glass being used in these buildings, any surplus capacity is likely to be fully used in the near future, at least temporarily.

20. Sheet Glass has visible distortion, particularly when viewed from a fairly acute angle and for this reason is not fully suitable for good quality mirrors or for glazing of windows such as shop windows or large so-called "picture windows" in houses.

21. It is a much cheaper glass to produce in the thickness normally used for house glazing and for this reason is used almost exclusively in that field.

22. Glass is melted in the continuous tank furnace previously described and flows into a kiln from which it is drawn by one of three processes, the Fourcault, the P.P.G. or the L.O.F. process.

23. In the Fourcault process a large refractory clay piece called a debiteuse is pressed down into the glass so that glass flows up through a slot in the middle. Initially this glass is carried up to the asbestos covered rollers in the annealing tower by a steel framework and the initial glass sheet draws behind it a continuous sheet of glass, and this process continues, the glass being cut into suitable sizes at the top of the annealing tower and taken to the warehouse for cutting into customers' sizes.

24. In all the sheet processes the main difficulty in getting the process to run is to prevent the wasting inwards of the sheet under the forces of surface tension. If this is allowed to happen the width of the sheet will narrow rapidly from say 100" wide to only a few inches wide in time of only a few minutes. Various devices are employed to stop this wasting, all depending on chilling the edge of the glass so that it sets solid quite rapidly and cannot thereafter become narrower. In the Fourcault process this is achieved at the debiteuse itself.

25. In the case of the P.P.G. process, there is a piece of claywork below the surface of the glass which can be of much the same shape as the debiteuse, and acts as a stabiliser of the position of the sheet. In this process the edges are held by water cooled edge rollers which grip about one inch of the edge of the sheet and at the same time cool the edge.

26. In both the Fourcault and the P.P.G. processes the sheet iscarried up vertically through a metal tower which acts as an annealing chamber. At the top of the tower some 28 feet above the furnace level the glass is cut off from the vertical ribbon, its edges which are both thicker than the rest of the sheet and also can be marred by contact with the edge rollers, are cut off and the remaining sheet is either despatched direct to the customer or is sent to a warehouse for inspection and cutting to smaller sizes.

27. The third sheet glass process is the L.O.F. Here the sheet is initially drawn vertically, much in the same way as in the P.P.G. process, but after rising only a few feet it is bent, while still plastic, over a special roller into the horizontal position and is then carried down a horizontal lehr as in the Plate or Float process.

28. Plate Glass:

The Figure shows an outline of this process. Glass from the melting furnace which has been cooled down in the working end of the furnace and in the canal is passed between water cooled steel rollers which produce a ribbon about 100" wide and normally rather more than 1/4" thick. This ribbon is conveyed on steel rollers into the annealing chamber or lehr where during its passage through the lehr, it is cooled down at a carefully controlled rate to ensure that it is free from strain when it emerges from the lehr.

29. table Up to the end of the lehr the process is identical whether the continuous grinding machine is used or the twin grinder. Taking the twin grinder process first; the ribbon is inspected for any faults which could cause trouble in the grinder, and the continuousribbon is passed into the grinder and ground between top and bottom grinding heads, being supported

during passage between adjacent heads by rollers.

30. In all grinding processes the purpose of the first and second heads is to remove enough glass to produce a flat plate. For this purpose rapid glass removal is necessary and coarse sand is used. The resulting surface is flat but also full of coarse pits from the coarse sand. These coarse pits have themselves to be removed by smaller sand grains and this process continues until a fine textured ground surface or "smooth" is produced. In order to achieve this smooth it has been found that a minimum of about twelve heads is needed not only to produce the necessary fineness of smooth but also this number of heads is required to create the right amount of small particles of sand needed in the head at the exit end of the machine.

31. There are two methods of dealing with the ribbon of ground glass. Firstly, it may be passed directly to a twin polisher where top and bottom surfaces are polished simultaneously or the ribbon may be cut into suitable lengths and stored ready for polishing on a continuous table polishing machine operating at high speeds.

32. Both systems have been used but it is often felt that it is better to break the processing at the end of the grinding plant so that there is more flexibility in the polishing plant, and glass stocking problems are reduced.

33. As was said earlier the glass can be treated in a different way at the end of the lehr and can be sent to the continuous grinding and polishing machine. This is an older process but is still very efficient and for some purposes is more flexible than the twin process.

34. In the plate glass plant feeding the continuous table machine the glass ribbon is cut at the end of the lehr and the so-called rough cast blanks which may be about 170" long x 100" wide are stored in a stock room until required by the continuous table polishing machine.

35. This machine consists of a series of abutting cast iron tables which move over mechanical slides in a horizontal direction. As each table reaches the end of the slide it is transported back to the beginning of the machine either on a track beside the machine or in a tunnel under the machine and is then put back into the train of abutting tables.

36. The glass laid on the tables passes under a series of grinding heads - again about twelve in number - is inspected in the centre of the machine while still on the tables and after emerging from the grinding heads and before entering the polishing section of the machine. Again there are a large number of polishing heads - usually upwards of twelve. The heads are faced with felt and a slurry of rouge and water is used as a polishing medium.

37. After emerging from the polishing heads the plates of glass are lifted off the tables and returned to the beginning of the machine where they are placed polished face downwards so that the other face can be ground and polished.

38. This process again needs a large production, though it is sometimes operated at rather lower outputs than the twin grinder. As explained before in connection with the twin grinder, at least twelve grinding heads are needed in order to carry out the required steps of reducing the size of sand grains and hence the depth of pit remaining in the surface of the ground glass, and also this number of heads is required to produce the required amount of sand of different grades for the grinding process. These same reasons make for a large continuous table machine and for a large output from the machine.

39. It is only possible to work out the economic size of unit when one knows all the factors in any particular country, the cost of materials, labour power and transport, for instance, but in general it can be said that the market demand for plate glass must reach 20-25 million square feet per year before a viable unit can be operated except behind very high tariff walls and, of course, at the expense of the consumer who must pay much above world prices for the plate glass made at low output and high cost.

40. FLOAT GLASS:

This is a new process. The product Float glass was introduced to the market in 1959. It is a glass which is now used interchangeably with plate for such purposes as a motor car windscreen, mirrors and good glazing. It is steadily capturing more and more of the plate glass market.

41. The Figure shows the outline of this process. Again glass is made in a continuous tank furnace, as in the case of plate glass, but before passing into the lehr the glass is passed onto a bath of molten metal. Here under the influence of physical forces it becomes flat and attains a fire-finished surface. From the bath it is taken in the form of a continuous ribbon into the lehr, where it is annealed and on emerging it is ready for cutting up and despatching to the customer, without any further processing such as grinding and polishing.

42. This process is still very young. Float glass is manufactured by the inventors in England, and has been licensed by them to one company in the United States, and it is rather too early to discuss the process in detail or consider the possibilities of this process for operation on a small scale.

43. PATTERNED GLASSES:

These are made from a tank furnace usually somewhat smaller in size than the furnaces for plate or sheet glass and are rolled in the same way as plate is rolled. However, the rollers of the rolling machine are engraved so that they impress a pattern on the glass being rolled between them. This process is also used for making wired glass, the wire being inserted in the middle of the sheet of glass during the rolling process.

44. HOLLOW GLASS BLOCKS:

These are made by pressing techniques and space does not permit a description of the process, which in any case is not likely to be of much interest in this context because of the fairly low demand in most countries.

Broadly there are two types of glass of this sort, self-coloured opaque glasses made as opals with colouring material added at the melting stage and, secondly, rolled glasses which have been subsequently coloured by a process rather similar to vitreous enamelling. This later type is frequently heat treated to give increased strength and resistance to thermal shock. This is important particularly where the glass is to be used in sunny climates and where the edge is contained in a frame. Under these conditions the edges covered by the glazing bars will not be heated as much as the central area of the glass, with result that the edges will be put into tension, in which condition any slight flaw in the edge caused, for instance, by the cutting process, will tend to start a break which will travel across the whole of the plate of glass.

46. I have dealt briefly with the variety of processes which are used in the flat glass industry to supply the glass to the building industry, but I have said little about the feasibility of using any of these processes on a small scale except where there were limitations inherent in the techniques of the process.

47. First of all glass is a cheap material; the main components in the cost are labour, fuel and raw materials as well as the capital charge for the plant. The only element of cost that I have mentioned which varies directly with production is the cost of raw materials. All the others drop slightly with reduced production but not nearly in proportion to the output. The easiest way of reducing the cost of glass is to increase the output of the unit and conversely the way of making expensive glass is to reduce the output of the unit and it is not long before the cost of manufacture is excessively high, and the manufacturing process becomes uneconomic.

48. Running through the processes I have mentioned, we can get some idea of the minimum yearly output that could justify a small unit. If this market exists a unit can be built and will operate at a reasonable cost, but probably not at a cost which would compete in open markets with exports from the main manufacturing countries.

PROCESS	MINIMUM YEARLY QUANTITY SQ.FT.
SHEET (Double strength basis)	20,000,000
PLATE	20,000,000
FLOAT	NOT YET AVAILABLE
ROLLED	15,000,000
GLASS BLOCKS (when made in conjunction with other pressed articles	100,000 Units
CLADDING GLASSES	2,000,000

49. If these markets are available then a case can be made out, at least for a cost exercise of manufacture if the raw materials mentioned in the first part of my paper are readily available at reasonable prices and of adequate quality.

50. It should be remembered, however, that for a variable time at the start up of the plant there may well be periods of high breakage and low quality. This period may well last for a considerable time, particularly if no really expert operating help is available. Scientific papers and written advice are very useful in their way but they are no substitute for the skill and experience of men who have spent years in operating the furnaces and machines. Sometimes experts offer their services to design, instal and start up glass plants. Anyone considering using their services should make absolutely certain that these experts have had real practical experience of running the type of glass plant they are prepared to start.

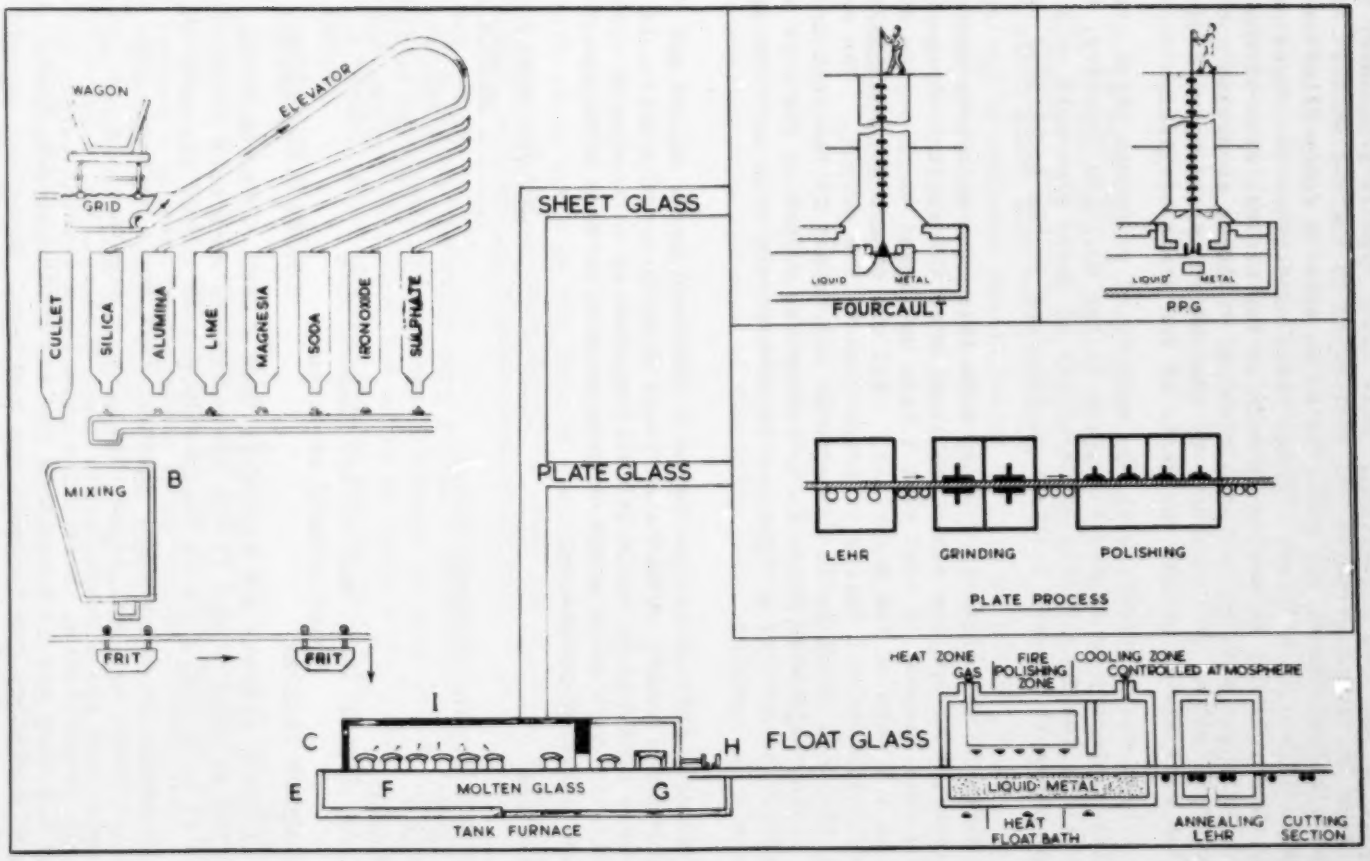
WAGON
ELEVATOR
GRID
CULLET
SILICA
ALUMINA
LIME
MAGNESIA
SODA
IRONOXIDE
SULPHATE
MIXING
B
FRIT
FRIT
SHEET GLASS
PLATE GLASS
LIQUID METAL
FOURCAULT
LIQUID METAL
PPG
LEHR
GRINDING
POLISHING
PLATE PROCESS
HEAT ZONE GAS
FIRE POLISHING ZONE
COOLING ZONE CONTROLLED ATMOSPHERE
I
C
H
FLOAT GLASS
E
F
MOLTEN GLASS
G
TANK FURNACE
LIQUID METAL
HEAT FLOAT BATH
ANNEALING LEHR
CUTTING SECTION

Fig. 1

961 E - Oct. 1962 - 1,600

E/CONF.39/D/93
SUMMARY
17 Oct.1962
ORIGINAL : ENGLISH

UNITED NATIONS CONFERENCE
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY
FOR THE BENEFIT OF THE LESS DEVELOPED AREAS

SUMMARY

Agenda Item: D.13

United Kingdom

THE PRODUCTION OF GLASS : POSSIBILITY OF SMALL SCALE PRODUCTION

By L.H.A. PILKINGTON, J.P., LL.D., M.A.

Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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THE PRODUCTION OF GLASS - POSSIBILITY OF SMALL SCALE PRODUCTION

by

L.H.A. PILKINGTON, J.P., LL.D., M.A.

1. There are six main types of glass used in building:-

(a) Sheet or window glass
(b) Plate glass
(c) Float glass
(d) Patterned glass
(e) Hollow glass blocks
(f) Opaque cladding glasses.

2. The chemical composition for the main glasses is given.

3. The design of tank furnace used for the manufacture of all types of glass varies with the quality required in the final product and with the output to be produced.

4. A diagram of all the processes mentioned is given, starting at the storage of the raw materials and ending with the finished product.

5. Great care in the selection of raw materials is essential and absence of colouring oxides such as iron and chromium is needed. Specifications of raw materials are given in the appendix.

6. Fuels for heating the glass are a large proportion of the raw materials - about ½ ton of coal or its equivalent per ton of glass is needed and transport cost of this and other raw materials should be considered when siting the factory as well as the transport costs of the final product to the customer.

7. It is important to use high grade refractory materials in the construction of the furnace.

8. Sheet or Window glass is used in very large quantities throughout the world mainly in housing and there is probably excess capacity in the world at the present time.

9. Sheet glass has some visible distortion and is not suitable for shop or other large windows or high class mirrors, but is cheaper than plate or float glass and is thus used almost entirely in domestic building.

10. There are three processes for making Sheet Glass, P.P.G., L.O.F. Fourcault and all three are described briefly.

11. PLATE GLASS:

freedom
This glass is used for high quality purposes where/from visible distortion is required. Large glazing plate, high quality mirrors and motor car windscreens are typical examples.

12. In the Plate process glass is rolled from a tank furnace in a continuous ribbon which is passed to a lehr through which it is passed on metal rollers and in which it is annealed.

13. On emerging from the lehr it must be ground and polished either by the Twin grinding process or the continuous table grinder.

14. The technical process of grinding involves not only the production of a uniform flat surface but also the gradual reduction of the depth of pit introduced during the production of the flat surface. This involves the use of at least twelve grinding heads and a consequently large and expensive machine.

15. With a large and expensive machine it is essential to produce high outputs so that the final cost of the glass will be able to compete with the imported product. A demand of 20 million square feet is suggested as the minimum requirement before a plant is justified.

16. FLOAT GLASS:

This is a new process. Float Glass is interchangeable with Plate. It is at present made only by one company and a licence to manufacture has recently been granted to one company in the United States.

17. A short description and diagramatic sketch of the process is given, describing the formation of a flat sheet of glass on a bath of molten metal.

18. PATTERNED GLASSES:

These glasses are made by a rolling process, and the product is translucent and used mainly in domestic buildings. It is a relatively cheap product.

19. HOLLOW GLASS BLOCKS:

Made by pressing hot "gobs" of glass in moulds on automatic machines, half blocks are later sealed by pressing together two half blocks after the edges have been melted. The blocks which are translucent and have a high thermal insulation value are used in domestic and commercial buildings.

20. OPAQUE CLADDING GLASSES:

These glasses are used more and more as a surface finish on the outside of buildings. Many colours can be produced and heat treatment of the glass is frequently undertaken to enable the glass to withstand the thermal shock caused by uneven heating of the glass by the sun.

21. YEARLY DEMANDS JUSTIFYING ECONOMIC PRODUCTION

SHEET (double strength basis)	20,000,000 sq.ft. per annum
PLATE	20,000,000 " " " "
FLOAT	Not yet available
ROLLED	15,000,000 " " " "
GLASS BLOCKS (when made in conjunction with other pressed articles)	100,000 units " "
CLADDING GLASSES	2,000,000 sq.ft. per annum

22. If these demands exist raw material supplies should be examined and cost exercises carried out.

23. Starting up a plant may result in quite prolonged periods of breakage and poor quality. If technical help is engaged it must be that of experts with real practical experience of running the type of glass plant that is being installed.

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17 Oct.1962
ORIGINAL : ESPAÑOL

CONFERENCIA DE LAS NACIONES UNIDAS
SOBRE LA APLICACION DE LA CIENCIA Y LA TECNOLOGIA
EN BENEFICIO DE LAS REGIONES MENOS DESARROLLADAS

Punto del programa : D.1.1

Argentina

LOS PARQUES INDUSTRIALES EN LA REPUBLICA ARGENTINA

Por Ingeniero Ernesto G. SILVA

Las monografías presentadas en la Conferencia de las Naciones Unidas sobre la Aplicación de la Ciencia y la Tecnología en Beneficio de las Regiones Menos Desarrolladas constituyen documentos de trabajo de dicha Conferencia. Se publican tal como han sido presentadas por los colaboradores y los puntos de vista expresados en ellas corresponden a los colaboradores. (Véanse notas al dorso.)

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D.1.1.

LOS PARQUES INDUSTRIALES EN LA REPUBLICA ARGENTINA

Por el Ing. Ernesto G. Silva

El parque industrial implica un concepto de organización relativamente nuevo, para promover la localización y el desarrollo en forma racional y ordenada. Se basa en las ventajas de reunir a la industria con el objeto de aprovechar los beneficios económicos y sociales que pueden derivarse del establecimiento de empresas en forma agrupada en lugar de ubicarlas separada e independientemente. - Constituyen una innovación social que a la vez que mejora o perfecciona las relaciones interindustriales permite influir sobre el desarrollo comunitario de una manera relativamente sencilla, pero con la posibilidad de lograr un ordenamiento conveniente y directo. Un parque industrial es una extensión de terreno subdividida y desarrollada de acuerdo a un plan integral, para ser ocupado por un conjunto de empresas industriales. En dicho plan debe incluirse la construcción de los servicios públicos básicos, y puede comprender otros más de acuerdo a las necesidades de las empresas que se radiquen.- También, aunque no necesariamente, podría hallarse prevista en el plan la construcción de edificios industriales para ser vendidos o alquilados a los ocupantes.

Así definidos los parques industriales organizados ofrecen muchas ventajas económicas a los industriales, a las comunidades locales y a los países en proceso de industrialización, ya que permite efectuar una localización correcta, modernizar y expandir la pequeña industria a la par que mejorar las relaciones interindustriales.

Situación Argentina

En comparación con la Argentina, existen pocos países que,con el grado de desarrollo que ha alcanzado tengan un crecimiento regional tan desequilibrado. El 45% de su población reside en el área abarcada por la Capital Federal y la provincia de Buenos Aires. Una tercera parte de la ocupación industrial se halla en la Capital Federal. La región Buenos Aires-Litoral concentra las dos terceras-partes de la ocupación industrial nacional y el 68% de su capacidad energética: en ella se encuentra la mayor parte de sus vías férreas y el 60% de los automóviles registrados. Estas cifras necesariamente reflejan grandes disparidades regionales en los ingresos per - cápita y en los niveles de vida.

Asimismo, estas desigualdades económicas regionales se traducen en la general insuficiencia de fuerza ejecutiva de instituciones provinciales que serían esenciales para el desarrollo económico. Sólo unas pocas provincias gozan de recursos financieros relativamente adecuados y menos todavía están dotadas de un buen mecanismo administrativo. Los gobiernos municipales resultan débiles, tanto en la faz administrativa como en la financiera, y sus métodos de planificación del crecimiento urbano, cuando existen, son anticuados. A pesar de este desigual desarrollo regional existe una actitud altamente promisoria en los dirigentes industriales del país, particularmente en el sector de la pequeña industria, quienes manifiestan día a día con mayor intensidad sus deseos de contribuir a la corrección de los factores apuntados. Se trata en general de gente de empresa y de ingenio, deseosa de encontrar oportunidades que les permitan una mayor participación en el proceso económico.

Mediante los parques industriales se podría contribuir en forma significativa al desarrollo de la industria. El objetivo en este aspecto, indudablemente debe de consistir en estimular a los empresarios privados para ue tomen a su cargo la mayor parte de los proyectos de instalación de estos entes. Sin embargo, el número de promotores potenciales resulta algo limitado en la actualidad, pero es razonable suponer que algunas de las entidades estatales de desarrollo de nuestro país pueden convertir algunos proyectos en modelos demostrativos de su uso. En aquellos casos en que no sea posible esperar de los promotores privados la ejecución de los proyectos, los gobiernos provinciales por intermedio de instituciones de fomento podrían realizar uno o dos ensayos locales, con el propósito específico de estimular el desarrollo de la industria y demostrar a los promotores potenciales la forma de llevarlos a la práctica, como así también las ventajas de su instalación.

El Parque Industrial de la Provincia de Córdoba

En la actualidad ya la provincia de Córdoba ha encarado un programa de acción para ejecutar un Parque Industrial Piloto en su ciudad Capital. Al efecto ha signado un convenio con la Comisión Nacional de Administración del Fondo de Apoyo al Desarrollo Económico (CAFADE) quien le proporcionará ayuda técnica extranjera, a través de USAID u Oficina de Cooperación Internacional dependiente del Departamento de Estado Norteamericano, y nacional en forma directa por intermedio de sus técnicos.

En pocas líneas trataremos de explicar cuales han sido las razonew que han llevado a elegir la Ciudad de Córdoba para desarrollar este proyecto demostrativo.

Córdoba es la tercera ciudad de la Argentina, ocupando este lugar después de Buenos Aires y Rosario que se encuentran dentro de la franja litoral. Ella misma está situada a unos 700 Km al noroeste de Buenos Aires. En tres de sus costados las chacras y estancias se extienden por cientos de kilómetros, mientras que en el cuarto se encuentran las Sierras de Córdoba que acusan elevaciones de más de

1.000 metros.

La provincia de Córdoba, con 1.760.000 habitantes en 1960, representaba el 8,7% del total de la población y aproximadamente el 7,5% de la ocupación industrial. El municipio de Córdoba es el que más rápidamente ha crecido entre todas las principales ciudades de la Argentina, aumentando de 388.000 habitantes en 1947 a 589.000 en 1960 y llegando a tener actualmente, según estimaciones, 625.000 habitantes. Desde 1955, Córdoba ha experimentado una transformación rápida pasando de ser una ciudad no industrial a convertirse en un gran centro industrial.

La industrialización de Córdoba se produjo principalmente como resultado de la radicación de las Industrias Kaiser Argentina -planta de fabricación de automóviles que ocupa actualmente más de 8.000 personas- y la del complejo Fiat que incluye la fábrica Concord para la producción de tractores, la de Grandes Motores Diesel y la de Materfer, empleando el conjunto 4.500 personas.

Las actividades combinadas de ambas compañías han dado origen a la instalación de 800 a 1.000 pequeñas fábricas, que son sus proveedoras, y la mayoría de las cuales pertenecen a la rama de los metalúrgicos, y por lo general son muy pequeñas.

El interés creado por la radicación de estas dos grandes firmas, y la evolución de muchas industrias proveedoras de ellas, ha atraído hacia Córdoba a un número importante de firmas nacionales y extranjeras. Actualmente se encuentran en la provincia un total de 3.000 industrias manufactureras de diverso tipo, estando la mayoría ubicada en o cerca de la ciudad capital.

La selección de Córdoba para la ubicación del Parque Piloto se basó en gran medida en su dinámico crecimiento industrial, los problemas locales que ello ha creado, y las oportunidades que brinda su mercado. También respondió a un programa nacional destinado a alentar constantemente la descentralización de la población y la ocupación hacia otras áreas fuera de Buenos Aires. Pero en definitiva, se decidió poner el parque piloto en Córdoba debido principalmente al notable grado de interés demostrado por la comunidad en general, y la colaboración prestada por sus representantes oficiales.

Luego de este primer paso dado por la provincia de Córdoba se insinúa ahora el interés de otras, como Jujuy y Santa Fé, en efectuar realizaciones semejantes.

A continuación analizaremos algunas de las características y ventajas que surgen del empleo de los parques industriales, en la creencia de que ellas serán tenidas muy presentes en las realizaciones que se concreten en nuestro país.

Características económicas

Hay buenos argumentos económicos para explicar porqué se aceptan los parques industriales en grado creciente y porqué puede esperarse aún que cada día se reconozca más su utilidad como instrumento de industrialización. Los siguientes son algunos de sus principales beneficios económicos:

1- Economías a escala: Derivadas del hecho de que los costos de desarrollo y mantenimiento de un parque industrial disminuyen para los propietarios individuales a medida que crecen las proporciones del proyecto. Se realizan inversiones para instalaciones básicas tal como la energía eléctrica - que excederían las posibilidades financieras de los pequeños industriales.-

2- Economías externas: Resulta económicamente factible proporcionar los servicios básicos infraestructurales a los ocupantes, a medida que se extienden las dimensiones del proyecto. La creación de una comunidad industrial redunda en un mayor estímulo al agrupamiento de empresas, porque las industrias se benefician mutuamente y la expansión del mercado que se obtiene atrae servicios adicionales.-

3- Aplicación del "principio del seguro": Como consecuencia del agrupamiento de empresas hay una disminución del riesgo involucrado en la inversión. Al extenderse el número de compradores de lotes mejorados y de edificios, disminuye el riesgo de que queden propiedades sin vender o alquilar.-

4- Una mayor facilidad de entrada en el negocio: La disponibilidad a breve plazo de lotes mejorados y de edificios en condiciones flexibles de crédito permite a las empresas comenzar sus operaciones con menos efectivo y retardo y, por lo tanto, con mayores perspectivas de éxito.-

5- Mejoras en la productividad industrial: La disponibilidad de fábricas modernas - que permiten un uso mas eficaz de la mano de obra y del equipo en los procesos productivos - aumenta la productividad industrial. En este mismo orden de ideas significan una eficaz arma de modernización industrial ya que permite mediante una acción conjunta de las fuerzas del trabajo encarar ciertas medidas institucionales tales como servicios de asesoramiento, centros de demostración o desarrollo, cursos de capacitación para obreros y personal directivo, servicios de investigación, formaciones de pools o bolsas de trabajo, etc.-

Como consecuencia de todo ello resultan especialmente significativos los efectos que produce su establecimiento sobre los empresarios individuales, la comunidad y el país en proceso de industrialización.-

Beneficios para el industrial:

Son los mas inmediatos y se deben principalmente a que la provisión de los servicios que necesita la empresa resulta mas rápida y económica que si debiera obtenerla por su propio esfuerzo. El industrial ahorra así tiempo y dinero que comúnmente gastaría en seleccionar un terreno adecuado y realizar gestiones del mas diverso tipo. Otro beneficio resulta de las posibilidades de financiación para la compra o arrendamiento de edificios y terrenos que ofrece el parque y especialmente del grado de flexibilidad que permite. -

Beneficios para la comunidad

Resultan de las posibilidades de cooperación con los intereses y organismos del lugar, en cuanto a la selección de industrias que en él se establecerán; los beneficios que derivan de un incremento de la actividad industrial y la ocupación; y de la atracción o estímulo que pueda ejercer el parque como núcleo económico sobre otras actividades industriales y comerciales, que ya se encuentren en sus alrededores o que busquen allí su radicación.-

Beneficios para la economía nacional

Que emanan de los estímulos que los parques proporcionan a la inversión industrial, especialmente en lo relativo a la pequeña industria, su modernización y productividad creciente.- Estas entidades podrían tener además relevante utilidad en una política de descentralización económica, lo que es particularmente útil en nuestro país para corregir su tradicional falta de equilibrio entre las condiciones sociales y económicas de las distintas regiones.-

Zonificación Industrial

La zonificación del empleo de la tierra por la cual se la restringe para ciertos usos especializados, no es cumplida uniformemente, ya sea en los países menos desarrollados como en los más avanzados. Aún con una eficiente administración comunal la zonificación no es completamente efectiva como instrumento de control y su aprovechamiento para otros rubros es frecuentemente permitido en áreas consideradas industriales. En ausencia de zonificación la radicación industrial que inevitablemente resulta mal distribuída aumenta el costo de la instalación de servicios para no entrar ya a mencionar la posibilidad de causar molestias y otras actividades perjudiciales para el público.-

En aquellos lugares donde se practica en forma insuficiente la zonificación del uso de la tierra como resulta el caso argentino, es mucho más fácil obtener todos los beneficios que de ella emanan mediante el empleo de los parques industriales.-

Descentralización Industrial

Por intermedio de una correcta ubicación del instrumento de desarrollo que resultan los parques industriales puede lograrse la descentralización de una zona urbana y también del país en general; pueden reducirse o evitarse las congestiones de tránsito, tan frecuentes en nuestros días y mejorarse las condiciones de salubridad y seguridad de la población.-

Por su parte las fábricas en el interior del parque pueden hallarse bien concentradas; un buen planeamiento puede prevenir la futura congestión especialmente con mejor planificación de calles, buenos sitios de estacionamiento y suministro de zonas espaciosas de carga. Con un control adecuado sobre el diseño arquitectónico, el incremento de la propiedad, la clase de los materiales utilizados en la construcción y la debida urbanización puede desarrollarse un ambiente en el que sea agradable trabajar y vivir.-

Junto con el beneficio que puede brindar a otros programas de acción resulta un medio poderoso para modernizar la pequeña industria y elevar la productividad física de los obreros de las fábricas.- Pueden introducirse mejoras importantes en la condición de los establecimientos industriales suministrando lugares de trabajo mas espaciosos, mejor iluminados y otras mejoras que tendnán por objeto aumentar la productividad.- Asimismo la comunidad industrial puede - contratar asesores que trabajan con los industriales en la mejora - de la administración del negocio entrenando supervisores a los efectos de superar la calidad del producto y standarizar la producción.

Instalaciones y servicios

Los servicios que proporciona un parque industrial pueden variar desde los mas sencillos hasta los mas complejos. En lo expresado - hasta aquí no nos hemos referido al tipo de elemental subdivisión - inmobiliaria que consiste en fraccionar la tierra para su venta directa, proporcionando las mejoras mínimas exigidas por las ordenanzas municipales; trátase ésta de una actividad bastante universal, que se asemeja a los remates inmobiliarios que se efectúan en la mayoría de las grandes ciudades argentinas. Aquí se considera mas - bien la "extensión industrial racionalmente organizada" que incluye mejoras del terreno, instalación de servicios generales y eventualmente la construcción de fábricas para los clientes y que, en su forma mas sencilla, prestaría únicamente servicios destinados a mantener la buena y agradable apariencia del parque industrial. Este tipo de servicios es el que mas comúnmente se brinda en Norteamérica, Inglaterra y otros países en que han alcanzado singular desarrollo. Pero el parque industrial podría tener también un desarrollo mas amplio, que proveyera construcciones fabriles de diversos tamaños y contemplara una variedad de facilidades crediticias, técnicas y de servicios e incluyera restricciones complejas y normas para la administración del proyecto dictadas en el interés de los ocupantes y del promotor. Entre esos dos extremos existe toda una gama de - servicios posibles, cuya instalación dependerá de la decisión del - promotor del mercado que exista para ellos y de las necesidades de la industria local. Un determinado tipo puede transformarse en otro. Los promotores ingeniosos siguen agregando nuevas características relativas a la provisión de edificios, métodos de financiación y - servicios posibles.-

En el parque industrial de tipo mas adelantado la empresa promotora suministra los servicios de diseño e ingeniería para la construcción de los edificios fabriles y proporciona facilidades de crédito a los clientes industriales. Las fábricas que se construyen - generalmente son de tipo standard, pero suele diseñárselas con cierta flexibilidad, para su mas fácil adaptación a requerimientos especiales. Los parques que preven el establecimiento de empresas que requieren espacios fabriles amplios y especializados suelen cons- - truirlos de acuerdo con las especificaciones del presunto ocupante.

Aunque puede haber una gran variedad de estructuras jurídicas, la mas común resulta la sociedad anónima o bien la de responsabilidad

limitada entre las que se desarrollan con fines de lucro, y la fundación sin fines de lucro. Existen parques industriales organizados en forma cooperativa, en los que las empresas ocupantes son propietarias del parque. En los EE.UU. las compañías de desarrollo industrial suelen financiarse mediante la emisión de acciones o títulos por suscripción pública, por lo general sin que se coticen en Bolsa.

Planificación interior del parque

Para asegurar la máxima eficiencia de operación dentro de los parque industriales, se han adoptado cierto número de salvaguardas de planificación. La eficiencia de esta operación se logra exigiendo que la disposición del terreno permita la libre circulación del tránsito de camiones sin que interfiera en los cambios de vía de los trenes de carga; haciendo que el trazado de las alcantarillas siga el de las calles principales y disponiendo las calles y vías en contornos tales, que los camiones estacionados y los vagones apartados queden en una superficie plana.

Los planificadores también se han esforzado en lograr que las curvas de las vías férreas fuesen mínimas; en evitar los ángulos cerrados en los cruces de calles importantes; en trazar los ejes de las calles de manera que la fachada de mejor apariencia del edificio quede dando frente al tránsito de la carretera y que la dimensión en longitud del futuro edificio no quede expuesta al deslumbramiento del sol de media tarde; en ver que el ferrocarril pueda llegar al máximo número de lugares y sus vías crucen el mínimo número de calles; en hacer que la construcción pueda llevarse a cabo en fases progresivas, si así se deseare, manteniendo en reserva los necesarios desahogos de terreno en vista de las necesidades futuras, y en var que el ancho de las calles sea adecuado para el tránsito que se prevé.-

Aunque por regla general se dispone lo necesario para permitir cierta flexibilidad, todo plan integral para la construcción de un parque industrial debe prever: a) disposición de su emplazamiento; b) preparación y clasificación de solares; c) calles; d) instalación ferroviaria; e) drenaje pluvial; f) alcantarillado sanitario; g) sistemas de gas y agua; h) sistemas eléctricos y telefónicos; i) plan de parcelamiento; j) costos de parcelamiento y k) controles de uso de los terrenos.-

En aquellas comunidades donde la distribución en zonas ya existente resulta inadecuada o anticuada, el control puede ejercerse por medio de convenios referentes a: a) vapores y olores; b) construcción y diseño de fábrica; c) paisaje; d) espacios despejados en la parte posterior de los edificios y playas de estacionamiento para vahículos del personal directivo y empleados; e) andenes de carga para camiones; f) instalaciones de almacenamiento; g) eliminación de desperdicios; h) rótulos y cartelones; i) cercos y muros; j) mejoras realizadas y k) otros factores. Los usos permitidos en el distrito industrial pueden quedar claramente definidos en las ordenanzas de distribución de zonas o bien en convenios de protección

que entran en vigor al efectuarse la venta del terreno.- En cuanto es posible resulta más conveniente especificar las normas de actuación más bien que enumerar los usos industriales que quedan prohibidos.-

Ha quedado fehacientemente demostrado que existe una relación directa entre el éxito de un distrito o barrio industrial planificado y el grado de control dentro del que se la mantenga. Un control adecuado, por medio de restricciones incorporadas a los convenios y ordenanzas de distribución por zonas, no sólo da como resultado la conservación o el aumento del valor del terreno para el que lo parceló y para sus ocupantes, sino que también favorece la armonía y la compatibilidad con las zonas residenciales cercanas.-

Algunas empresas promotoras de parques industriales proporcionan un servicio por el que el arquitecto y contratista del servicio supervisan el proyecto, construcción y mantenimiento de la nueva fábrica, ateniéndose a las especificaciones dadas por el fabricante y que estén de acuerdo con los reglamentos de construcción y con las restricciones establecidas en el distrito. Además si es necesario se puede lograr ayuda financiera,en condiciones favorables, proporcionada por la empresa administradora del parcelamiento. Todo lo que la compañía ha de hacer es escoger el lugar en el parque.-

En algunos casos el parcelador (particular, comunal o estatal) llega hasta construir la estructura resistente del edificio, que cuando se le encuentre ocupante, puede finalizarse en un plazo de 3 a 4 meses, ajustándolo a las necesidades del cliente.-

Financiación de Parques Industriales

En las actuales condiciones de aprieto financiero, la financiación de parques industriales puede resultar un obstáculo importante en vista de la envergadura de la inversión que se requiere para cada proyecto.-

Los gobiernos nacionales y provinciales, así como las entidades bancarias y las compañías financieras, deberán prestar muy detenida atención a este problema. En la mayoría de los casos, sin embargo, se encontrará que, mediante la construcción por etapas, se podrán financiar los proyectos con fondos de monto reducido. Los ingresos provenientes del núcleo original constituído por una primera inversión, junto con algún capital prestado, permitirían la construcción en etapas, utilizando los fondos de una manera rotativa. Mediante un sistema de venta, en lugar del de locación, se ayudaría a reducir la presión sobre el capital de inversión requerido. Además, como las inversiones en parques industriales se caracterizan por un riesgo disminuído, resultarán muy atractivas para las instituciones financieras.-

Deberían elaborarse diversas formas de financiación para que resulten suficientes las limitadas cantidades de capital propio de que dispongan los industriales provinciales que deseen establecer operaciones nuevas o ampliadas. Podría ser orientada a este fin la

integración de los sectores especializados de las diversas instituciones crediticias. Este tipo de disposiciones debería aplicarse - tanto a la construcción de parques como a la erección de edificios industriales individuales. Donde fuera posible podrían ampliarse las fuentes de crédito a largo plazo, para proporcionar más crédito para inversión en la construcción de instalaciones. Algo semejante podría aplicarse a los recursos de las compañías de seguros, que se usan actualmente para inversiones en vivienda exclusivamente. De permitirlo los fondos con que cuentan los bancos para fines de préstamo, sería posible orientarlos en mayor medida hacia - inversiones a largo en vez de a corto plazo.-

Finalmente podrían encararse algunas medidas tendientes a robustecer las Bolsas de Valores de manera que puedan recurrir en forma más eficaz a los ahorros públicos.para la inversión en proyectos - del tipo que estamos tratando.- Las bolsas han registrado en general creciente interés público, en los últimos años, en la compra de acciones industriales.

Mediante una mayor seguridad para los inversionistas, se aumentará la confianza pública, y los esfuerzos bien planeados para la divulgación amplia de las informaciones pertinentes contribuirán a hacer más eficaces a las bolsas como instrumentos para movilizar los ahorros del público hacia inversiones en proyectos de parques industriales.-

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INDUSTRIAL PARKS IN THE ARGENTINE REPUBLIC

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Papers have been contributed to the United Nations Conference on the Application of Science and Technology for the Benefit of the Less Developed Areas as working papers for that Conference. They are published as presented by the contributors, and the contents and the views expressed are those of the contributors. (See notes overleaf.)

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INDUSTRIAL PARKS IN THE ARGENTINE REPUBLIC

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Industrial parks imply a relatively new organization concept to promote the localization and development of industry in a rational and orderly fashion. The concept is based on the advantages and economic and social benefits that may be derived from the establishment of enterprises in groups instead of separately and independently. An industrial park is an extension of land which is subdivided and developed in accordance with the needs of the companies installed therein. The plan for the park may include, although not necessarily, provisions for the construction of industrial buildings to be sold or rented to the occupants.

Organized industrial parks as defined above offer many advantages to industrialists, local communities, and countries in the process of industrialization, since they make it possible to place industry correctly and modernize and expand small industry, while improving inter-industrial relations.

The Argentine Situation

Compared to Argentina there are few countries at the same level of development with so little balance in their regional growth. Forty-five percent of the population lives in the area comprised by the Federal Capital and the province of Buenos Aires. One third of the country's industrial employment is in the Federal Capital, and two-thirds in the Buenos Aires-littoral region which is also where 68% of the total electric energy capacity is to be found. These figures necessarily reflect great regional differences in per-capital incomes and standards of living, which are also reflected by the lack of executive strength in such provincial and municipal institutions as are essencial to economic development.

By means of industrial parks the development of industry might be significantly advanced, and a contribution made towards eliminating regional inequalities.

In this connection a highly promising attitude can be observed in the country's industrial managers, particularly in the small industry sector, who are daily giving increasing evidence of their wish to help in correcting the above mentioned factors. However, the number of potential promoters is rather limited at present, and for this reason the provincial governments through promotion institutions should undertake the establishment of one or two industrial parks as local trials. They would thereby stimulate industrial development and provide a demonstration of the use to which the parks may be put.

The province of Cordoba has already undertaken an action program to establish a Pilot Industrial Park in its capital city, and the interest of other provinces such as Jujuy and Santa Fe in following suit has become apparent.

Characteristics of an Industrial Park

By properly placing these parks the decentralization of an urban

zone and of the country in general may be achieved; traffic congestion can be reduced and improvements made in health and safety conditions.

Although as a general rule a certain amount of flexibility is allowed for, any integral plan should provide for: a) site location; b)preparation and classification of lots; c) streets; d) railroad installations; e) sanitary installations; f) gas, water, electricity and telephone systems; g) land division; and h) land use controls.

In communities where present land distribution in zones is inadequate or old-fashioned, controls may be applied on the basis of agreements concerned with: a) fumes and odors; b) factory design and construction; c) landscape; d) free space behind buildings, and parking lots for vehicles; e) loading and unloading platforms for trucks; etc.

Some promoting companies provide a service through which an architect and a contractor supervise the project and the construction and maintenance of the new factory, following specifications provided by the manufacturer which are in turn in accordance with the construction rules and the restrictions governing the district.

Under the present conditions of financial stress, the financing of industrial parks could be a significant obstacle in view of the size of the investment needed for each project. The national and provincial governments, as well as the banking and financial institutions, should give careful attention to this problem. However, it will be found that by undertaking construction in stages, projects can be financed both as regards the construction of parks and the erection of industrial buildings with reduced amounts of funds used on a rotating basis. Furthermore, by selling instead of renting properties, a contribution can be made towards reducing the pressure on the investment capital required.

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